The invention claimed is:

1. An integrated process for the preparation of paraffin alkylate from a C4 feed containing isobutane, isobutene, normal butane, butene -1, butene 2, dienes and mercaptans comprising:

removing dienes and mercaptans from said C4 feed;

isomerizing a portion of the butene-1 to butene-2;

separating iso C_4 components from the normal C_4 components;

hydrogenating a portion of the isobutene in said iso C_4 components to isobutane;

recombining said normal C_4 components and said iso C_4 components and

alkylating isobutane and normal butenes in said recombined C_4 components to produce an alkylate comprising isooctane.

2. The process according to claim 1 wherein said removing of dienes and mercaptans comprises reacting said dienes and mercaptans in the presence of a thioetherification catalyst and hydrogen under thioetherification conditions to form sulfides and fractionating the resultant mixture to separate a heavy portion comprising said sulfides.

3. The process according to claim 1 wherein said isomerizing is carried out in the presence of an isomerization catalyst and hydrogen under isomerization conditions.

4. The process according to claim 1 wherein said separating is by fractionation.

5. The process according to claim 1 wherein said alkylating is carried out in the presence of an acid catalyst under alkylation conditions.

6. An integrated process for the preparation of paraffin alkylate from a C_4 feed containing isobutane, isobutene, normal butane, butene -1, butene 2, dienes and mercaptans comprising:

reacting said dienes and mercaptans in the presence of a thioetherification catalyst and hydrogen under thioetherification conditions to form sulfides and fractionating the resultant mixture to separate a heavy portion comprising said sulfides;

isomerizing a portion of the butene-1 to butene-2 in the presence of an

isomerization catalyst and hydrogen under isomerization conditions;

separating iso C_4 components from the normal C_4 components by fractionation;

hydrogenating a portion of the isobutene in said iso C_4 components to isobutane;

recombining said normal C_4 components and said iso C_4 components and

alkylating isobutane and normal butenes in said recombined C_4 components in the presence of an acid catalyst under alkylation conditions to produce an alkylate comprising isooctane.

7. A process for the utilization of refinery C_4 streams in the production of gasoline comprising the steps of:

(a) feeding hydrogen and a mixed C_4 stream containing normal butane, isobutane, 1-butene, 2-butene, isobutene, dienes, mercaptans and C_5's to a first distillation column reactor containing a bed of thioetherification/ hydrogenation catalyst;

(b) concurrently in said first distillation column reactor,

(i) reacting the mercaptans and a portion of the dienes in the presence of said thioetherification/ hydrogenation catalyst to produce sulfides,

(ii) reacting at least a portion of said dienes with said hydrogen to form mono olefins including additional butenes, and

(iii) separating said sulfides and said C_5's from said normal butane, isobutane, 1-butene, 2-butene and isobutene by fractional distillation;

(c) removing said C_5's and said sulfides from said first distillation column reactor as a first bottoms;

(d) removing said normal butane, isobutane, 1-butene, 2-butene and isobutene from said first distillation column reactor as a first overheads;

(e) feeding said first overheads containing said normal butane, isobutane, 1-butene, 2-butene and isobutene to a second distillation column reactor containing an bed of isomerization catalyst;

(f) concurrently in said second distillation column reactor,

(i) isomerizing a portion of the 1-butene to 2-butene, and

(ii) separating the 2-butene and the normal butane from the isobutane,

isobutene and unreacted 1-butene;

(g) removing the 2-butene from said second distillation column reactor as a second bottoms;

(h) removing the isobutane, unreacted 1-butene and isobutene from said second distillation column reactor as a second overheads;

(i) feeding said hydrogen and second overheads containing said normal butane, isobutane, isobutene and 1-butene to a third distillation column reactor containing a bed of hydrogenation catalyst to concurrently;

(i) hydrogenate a portion of the 1-butene and isobutene to form a reaction product comprising butane and isobutane and

(ii) fractionate the reaction product to produce a third overheads; and

(j) removing the normal butane, isobutane, 1-butene an isobutene from said third distillation column reactor as a third bottoms.

8. The process according to claim 7 wherein said second and third bottoms are fed to a cold acid alkylation unit.

9. The process according to claim 7 comprising recovering said third overheads comprising hydrogen, isobutane, 1-butene and isobutene; condensing said third overheads to recover a condensate comprising isobutane, 1-butene and returning said condensate to said third distillation column reactor as reflux.

10. The process according to claim 7 wherein said third distillation column reactor contains a bed of acidic cation exchange resin above said bed of hydrogenation catalyst and a portion of the isobutene is oligomerized to produce diisobutene which is hydrogenated in said bed of hydrogenation catalyst and said diisobutene is removed as a third bottoms and said isobutane, 1-butene and isobutene are removed as a third overheads.

11. The process according to claim 10 wherein said second bottoms and said third overheads are fed to a cold acid alkylation unit.

12. The process according to claim 10 wherein the normal butane, isobutane, 1-butene and isobutene is condensed and a portion is returned to said third distillation column reactor as reflux.

13. The process according to claim 7 wherein said hydrogenation is downflow.